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department of  
*WATER & SEWERS*  
annual report

1969



CITY OF CHICAGO, RICHARD J. DALEY, MAYOR



CHICAGO  
CITY  
COUNCIL  
1969

HON. RICHARD J. DALEY  
Mayor

RALPH H. METCALFE (a)  
CLAUDE W. B. HOLMAN (b)  
President Pro Tem

JOHN C. MARCIN  
City Clerk

MORTON A. GORDON  
Deputy City Clerk

ALDERMEN

Ward

1. Fred B. Roti
2. Fred D. Hubbard
3. Ralph H. Metcalfe
4. Claude W. B. Holman
5. Leon M. Despres
6. A. A. Rayner, Jr.
7. Nicholas J. Bohling
8. William Cousins, Jr.
9. Dominic J. Lupo
10. John J. Buchanan

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11. Michael A. Bilandic
12. Donald T. Swinarski
13. Casimir J. Staszczuk
14. Edward M. Burke

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21. Wilson Frost
22. Otto F. Janousek (d)
23. Frank J. Kuta
24. George W. Collins

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31. Thomas E. Keane
32. Theris M. Gabinski
33. Robert Brandt
34. Ray Sande

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41. Edward T. Scholl
42. Raymond K. Fried
43. G. Barr McCutcheon
44. William S. Singer
45. Edwin P. Fifielski
46. Joseph R. Kerwin
47. John J. Hoellen
48. Robert J. O'Rourke
49. Paul T. Wigoda
50. Jack I. Sperling

Robert F. ...  
Record Cl

Alec Busta  
Assistant  
Sergeant-at-Arms

(a) Resigned December 9, 1969

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City of Chicago, Department  
ANNUAL REPORT,  
DEPARTMENT OF WATER  
AND SEWERS, CITY OF  
CHICAGO.

DATE	ISSUED TO

The Honorable Richard J. Daley, Mayor  
The Honorable Members of the City Council  
City of Chicago, Illinois

Gentlemen:

With this Seventeenth Annual Report, I submit to you the more significant activities of the Department of Water and Sewers during 1969.

Water of a consistently high quality is supplied to the 4,738,000 residents of Chicago and about 44% of the population of Illinois. The Chicago Water System is growing by this Report, its facilities included: plants; four active or stand-by water supply tunnels; and a system which is completely self-supporting. Operation costs are paid directly or indirectly by the ratepayers.

The Chicago Sewer System, which varies in size from the 10-inch diameter concrete sewers 21.5 feet wide by 19 feet high to the 60-inch diameter concrete sewers 19 feet wide by 19 feet high, is maintained by the Bureau of Sewers. The Bureau of Sewers is responsible for the City of Chicago's sanitary and storm water disposal.

The Department's achievements during 1969 are a result of your leadership and guidance, Mr. Mayor. We are grateful also for the cooperation of other governmental agencies, including the Federal Government, State of Illinois, and County of Cook. Our sincere thanks, as always, go to the employees for their dedicated service.

Respectfully submitted,

*James J. Connelley*  
Commissioner

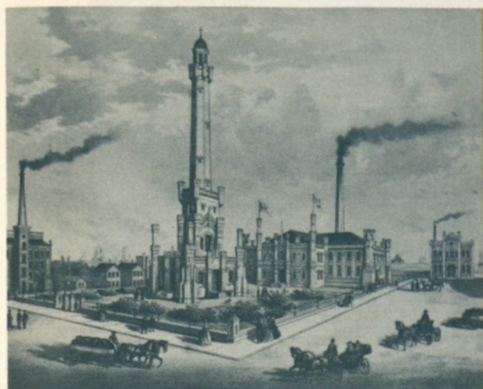
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1969 ANNUAL REPORT



DEPARTMENT OF WATER & SEWERS  
CITY OF CHICAGO





Old Water Tower and Chicago Avenue Pumping Station 100 years ago.



Center—Today . . . architectural giants of three eras.  
Right—Mayor Richard J. Daley unveils plaque honoring Nation's first water landmark.

- During the year covered by this Report, the water pumped through the distribution system totaled more than 373 billion gallons, to average about 1,023 million gallons per day.

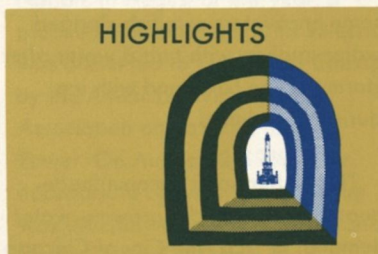
- Total receipts of the Water Collection Division amounted to \$59,082,480.14 in 1969. Of this amount \$59,024,608.78 was collected for Water Fund revenue items. During 1969, \$11,531,243 was invested in capital improvements of the Chicago Water System. Programmed expenditures for capital improvements over the next five years total approximately \$108,053,000.

- More than 20 miles of new water mains have been placed in service since the beginning of 1969 and 21 miles of sewers were constructed. In addition, 978 new catch basins and 779 new manholes were added to the sewer system.

- Laboratory tests of water samples conducted during the year totaled 614,655, an average of nearly 1,684 a day.

- Bench and Grade Section engineers of the Bureau of Sewers established elevations for 56 new street grades, and 197 standard bench monuments and ordinary benches.

- The program for the conversion of all boiler equipment in the five steam operated pumping stations to use gas fuel (with oil as a secondary fuel) instead of coal progressed on schedule.



- The Chicago Water Tower grounds won an award for its outstanding contribution to the beautification of the City from the Chicago Beautiful Committee in October of 1969, the third consecutive year that properties of the Department of Water and Sewers have been so honored.

- During the year covered by this Report, two more suburban communities were added to the list of those supplied with water through the operations of the Chicago Water System, bringing their total up to 72.

- Engineering consulting firms were retained during the year for the purpose of studying alternate methods of sediment disposal at the filtration plants and to evaluate and review the operating procedures of the Chicago Water System.

- Training activities were even more intensified in 1969. During the year, many programs were either initiated, followed or concluded for the purpose of increasing the knowledge and interest and further developing the skills of Departmental personnel in varied fields and grade levels. The Department also cooperated with students and colleges in the Chicago area by employing potential permanent technical personnel during the summer months as engineers and laboratory technicians-in-training.

- A total of 15,983 persons took part in guided tours through the Central Water Filtration Plant during 1969. Guests included 100 foreign dignitaries, engineers, scientists and other visitors from 17 different countries.

- During 1969, the year of the Chicago Water Tower's centennial anniversary, the Tower was selected by the American Water Works Association to be the first American Water Landmark in the Nation.



the Chicago Avenue Pumping Station was destroyed by the fire, the station, which is located just across Michigan Avenue from the Water Tower, was back in service in eight days.

Architect Boyington selected Castellated Gothic as the style to be followed in the construction of the Tower. The foundation consists of 168 piles filled with concrete and capped with 12-inch oak timbers. Massive stones laid in cement completed the base up to six feet below grade. Constructed of Joliet limestone blocks quarried in Illinois, the Tower rises in five sections from the square ground-level base with battlement pillars at each of the four corners. Each of the 40-foot wide sides has a stately doorway and two grand windows.

The second and third sections are similar in design as they rise in diminishing size, and the octagonal tower centered on, and set back from, the top of the third section rises 154 feet above the ground level. The standpipe was removed in 1911 since it was no longer needed. The spiral staircase which encircled the standpipe is intact and is still used to reach the Tower cupola.

On March 25 of 1967, Chicago also observed the hundredth anniversary of the cornerstone laying ceremony which took place shortly after the construction of the Tower began in 1867. On this anniversary occasion, Mayor Daley presented a block of the Tower's original stone to the President of the John Hancock Mutual Life Insurance Company to be included in the building material for the mammoth 100-story John Hancock Center which was being constructed just a short distance from the Old Tower at that time.

Back in 1867, the City water system was capable of producing 18

Above—Looking upward from base of new shaft.  
Below—Tunneling machinery is removing cut-away bedrock.

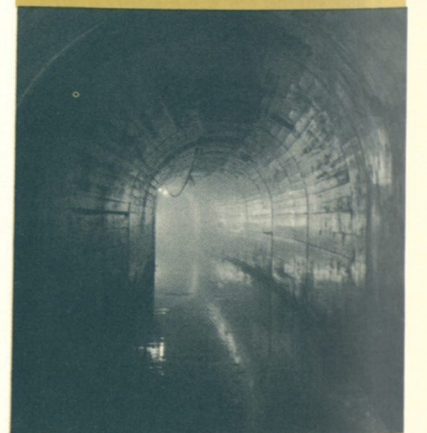
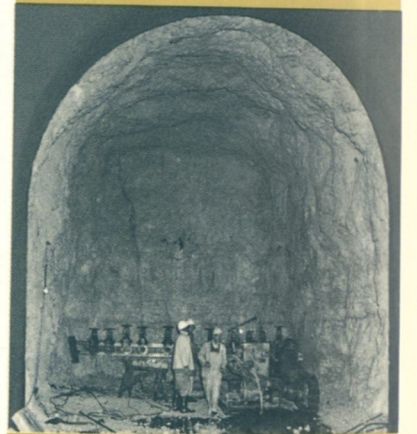
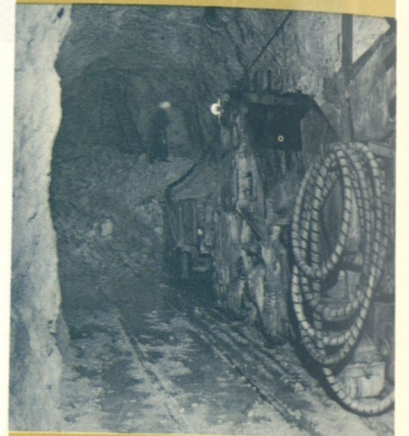
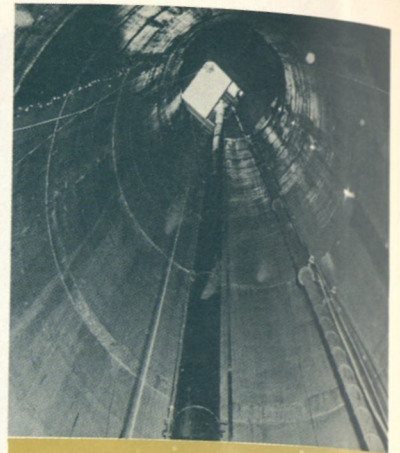
million gallons of water a day which was about 60% more than the need of the residents at that time. Today, Chicago's water filtration plants, the two largest in the world, can produce high-quality potable water at the rate of 2-billion, 600-million gallons a day during periods of peak demand to meet the needs of Chicago and the 72 suburban communities supplied by the Chicago Water System.

When the Two-Mile Crib and the tunnel were put into operation in 1867, a new era in waterworks engineering had opened. Today the facilities of Chicago's water system include: 72 miles of water supply tunnels from 6 to 20 feet in diameter, under the Lake and land; eleven pumping stations; and four active or stand-by water intake cribs which stand in water from 32 to 35 feet deep. Nearly all the supply tunnels are constructed of concrete and are from 65 to 200 feet underground, depending upon the depth of the rock in which they are constructed.

Chicago's raw water supply is obtained either from the shore intakes of each of the water filtration plants or from cribs located out in the Lake. The South Water Filtration Plant uses the Edward F. Dunne Crib (two miles from shore), as its source of supply for a greater amount of time than it uses its shore intakes.

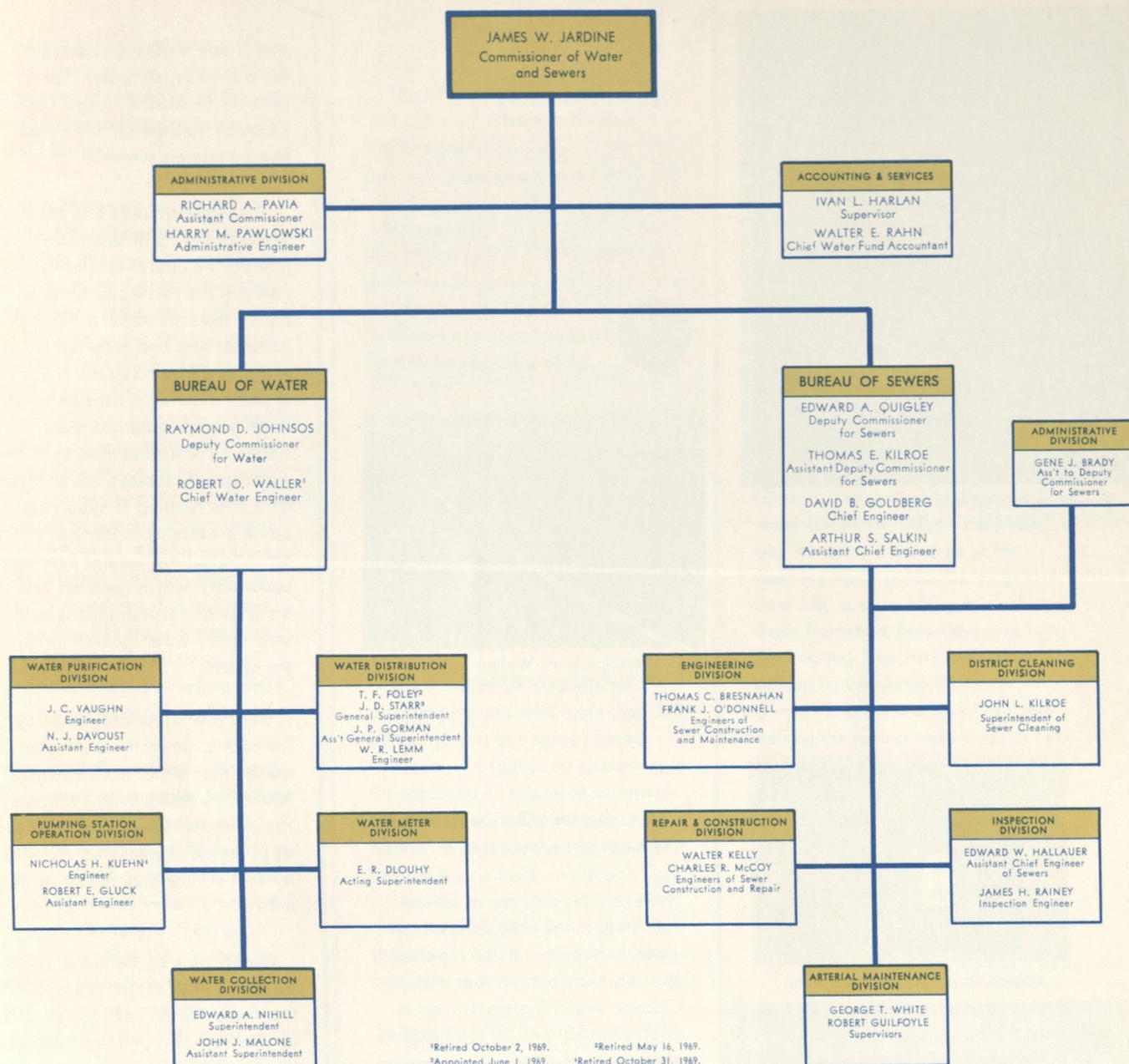
The Central Water Filtration Plant will soon be receiving raw water through the new tunnel connection with the William E. Dever Crib as well as from its shore intakes.

Above—Preparing for connection of new 20-foot tunnel.  
Below—A completed water tunnel—ready to operate.





## DEPARTMENT OF WATER AND SEWERS



## ADMINISTRATION AND FUNCTIONS

The Commissioner of Water and Sewers, as chief executive officer of the Department, is directly responsible to the Mayor and the Chicago City Council. Each of the component Bureaus, the Bureau of Water and the Bureau of Sewers, is headed by a Deputy Commissioner.

The Bureau of Water is entrusted with the operation and maintenance of the Chicago Water System which furnishes a good quality, filtered water to all of Chicago and 72 suburbs. The Bureau is composed of five Divisions: (1) the Purification Division which operates and maintains the two largest water treatment plants in the world and monitors the water supply to insure its potability; (2) the Pumping Station Operation Division which operates and maintains four water intake cribs and eleven pumping stations; (3) the Water Distribution Division which operates and maintains the water distribution system and constructs additional water mains as needed; (4) the Meter Division which operates the meter repair shop, installs large meters, inspects and makes repairs of meters in the field and main-

tains complete records on all meters; and (5) the Collection Division which reads meters in service, and bills, collects and accounts for water charges.

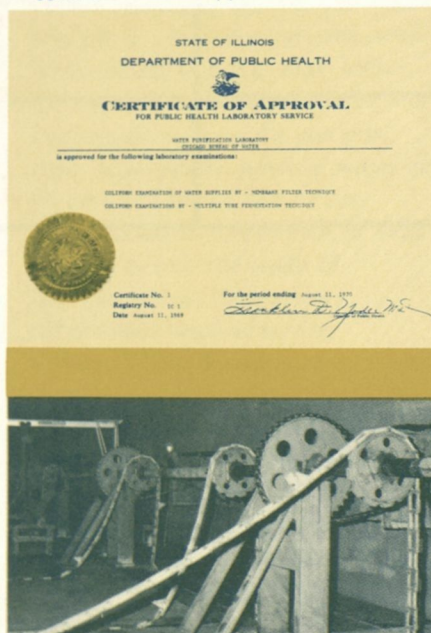
The Bureau of Sewers operates and maintains the Chicago Public Sewer System which collects and transports sanitary and industrial wastes and surface water drainage to the interceptor sewers of the Metropolitan Sanitary District of Greater Chicago. The Bureau is composed of the Administrative Division and five other Divisions: (1) the Engineering Division which plans and designs sewer extensions, betterments and major repairs; (2) the Cleaning Division which scrapes and flushes sewers and cleans catch basins on a district basis; (3) the Repair and Construction Division which makes repairs to the Sewer System on a district basis; (4) the Arterial Maintenance Division which cleans and repairs City arterial highway sewers; and (5) the Inspection Division which supervises sewer construction, the installation of connections and the underground work of others done near public sewers to protect the sewers from damage.



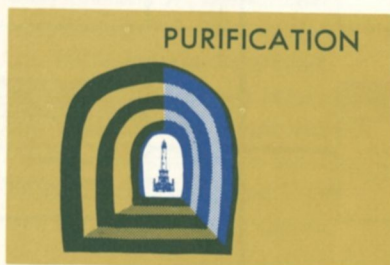


New 20-foot tunnel connection to Central Water Filtration Plant.

Department's laboratory earns State's first approval.



Scrapers in a South Water Filtration Plant settling basin.



Responsibility for the operation and maintenance of the world's two largest filtration plants is entrusted to the Water Purification Division of the Department's Bureau of Water. The South Water Filtration Plant, which completed its 24th year of operation during 1969, together with the Central Water Filtration Plant, which officially went into full operation during October of 1964, have a total of 312 filters. It appears likely that the two treatment plants are known as "water filtration plants" because their filter units are among the largest and most noticeable items of plant equipment.

Actually, filtration is a final step in the treatment procedure—a "polishing" operation—the finishing touch. However, it is only one of several vital steps in the processing of raw water to transform it into the clear and sparkling product that the Chicago Water System delivers to approximately 44% of the residents of the State of Illinois.

All human activities depend to some degree upon water; it is a basic necessity for the sustenance of life. The record of this Department's reliability since its establishment in 1953 inspires confidence in the capability of the Water System to continue meeting the ever-increasing need for high quality water by consumers in a growing area.

The endeavors of the Water Purification Division are by no means restricted to the provision of water

that is safe for human consumption but also to supply water that is pleasant to drink. Chicago water meets all the criteria; it is a high quality potable water.

The responsibilities and activities of the Water Purification Division include: the operation and maintenance of the two water filtration plants; the supervision of the sterilization of new and repaired water mains, tunnels and shafts; the review of plans in terms of accepted standards for new suburban water system facilities; the making of raw water quality surveys; the analysis of field data relating to supplying safe potable water to consumers; and the operation of the Central Purification Laboratory, which conducts research, analyses and investigations to insure satisfactory water quality throughout the system.

Since raw water obtained from the cribs is generally of a higher quality than water from the shore intakes, the South Water Filtration Plant uses the Edward F. Dunne Crib as its source of supply for a greater amount of time than it uses its shore intakes.

Construction of the tunnel connecting the Central Water Filtration Plant with the William E. Dever Crib (a little over two and one-half miles from shore) neared completion in 1969. When the new tunnel and crib system commences operating, the Central Plant, which had been restricted to the use of its shore intakes, will also have a second source of raw water.

Before water reaches the filtration stage of the treatment process, it passes through the chemical application channels where chlorine is added to sterilize the water. Aluminum sulfate (alum) and chlorinated



ferrous sulfate (iron sulfate) are added to aid in coagulation and settling out of impurities as the water moves to the mixing basins and the settling basins.

Other chemicals added include lime to reduce corrosion of pipes in the homes of consumers as well as in the water main distribution system. A complete caustic soda system that was installed at the Central Water Filtration Plant has proven to be an effective supplement to the use of lime. Anhydrous ammonia is used to eliminate chlorine tastes and to lengthen the action of the chlorine on microorganisms. Activated carbon is utilized to remove objectionable tastes and odors. Also, it has been confirmed that the fluoridation of water (a procedure that has been followed by this Department since mid-1956) is a safe, effective and economical method of substantially reducing dental caries in children.

During 1969, the Water Purification Laboratory continued to improve its techniques through the instrumentation now available. A new gas chromatograph separates fractions of organic contaminants extracted from water by means of carbon filters. These particles can then be identified by putting them through an infra-red spectrometer which provides a chemical "fingerprint" of the material. This could lead to definite identification of contaminant sources. An atomic absorption unit provides rapid, accurate determinations of the metallic elements.

It is worthy to note at this point that the Department microbiology laboratory was approved by the Illinois State Board of Health. It is the first laboratory conducting bacteriological analyses of water to be so approved and the Certificate of Approval issued to this Department by the State is numbered ONE.

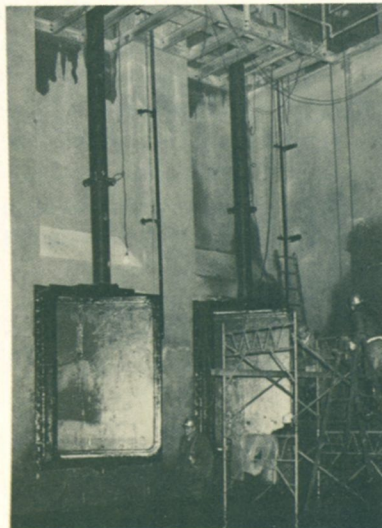
The Division made a total of 614,655 plant laboratory tests of water samples in 1969, and the electron microscope was used for 10,137 examinations during the year. Control laboratories maintained at both filtration plants are staffed 24 hours each day to provide the information needed in adjusting treatment procedures to conform to need as the raw water quality varies.

Water samples are taken at regular intervals from Lake Michigan, the Calumet River System, intake cribs, pumping stations and the distribution system by the Water Quality Surveillance Section of the Water Purification Division and tested by the Water Purification Laboratory Section.

The filtration plants supplied pumping stations with more than 373 billion gallons of treated filtered water for distribution to consumers in Chicago and 72 suburban communities. A total of 35,886 tons of chemicals were used in the treatment processes.

On April 11 and 12 during 1969, the alewife barrier net, a triangular enclosure around the intake ports of

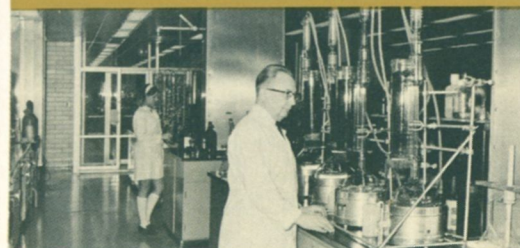
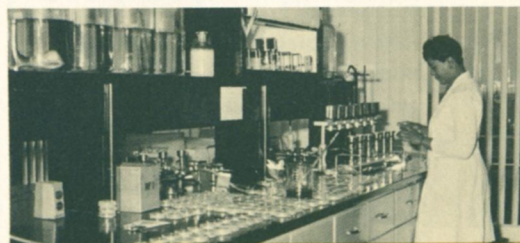
Installing butterfly valves in a South Water Filtration Plant intake basin.



the Central Water Filtration Plant, was installed—the fourth year this procedure has been followed. Since its original installation in 1966, the net has proven to be most effective in limiting the number of alewives entering the plant's shore water intake. The purpose of the alewife barrier net is to protect the intake screens from clogging during the alewife movement, which begins in spring, by diverting—not catching—the schools of fish. The net was removed on July 15th.

During the year, a total of 15,983 visitors toured the Central Water Filtration Plant, the world's largest water treatment facility. The public was invited to participate in the tours regularly conducted by guides from 1:00 p.m. to 5:00 p.m. on Tuesdays, Thursdays, Saturdays and Sundays during June, July and August, and on Saturdays and Sundays during the other months of the year. Among the visitors were students of all levels, including many grammar school pupils. Also, about 100 foreign dignitaries, engineers, scientists and others from 17 different countries took part in the tours.

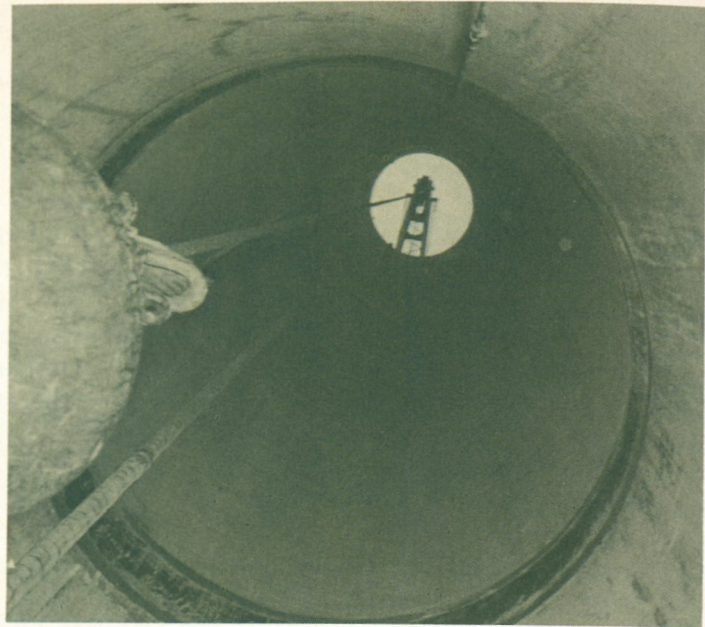
The membrane filter method is being used in a bacteriological examination of water.



The latest techniques for determining organic pollutants in lake water are followed.



Pressure tunnel's drift near shaft's bottom when under construction.



Looking up newly completed outlet shaft for pressure tunnel at Mayfair Pumping Station.

## DISTRIBUTION



The basic responsibility of the Bureau of Water's Distribution Division is to operate and maintain the underground system of pipes transporting treated, filtered water under suitable pressures from Chicago's eleven pumping stations to its ultimate destinations in the City's 227 square miles and in sufficient quantity to meet the additional demands of the 72 suburban communities it serves.

The combined efforts of the Distribution Division and the Pumping Station Operation Division are essential also in maintaining and servicing the fire hydrants to insure reliable fire protection within the corporate limits of the City of Chicago.

The Distribution Division, which installed 175 new fire hydrants during 1969, maintains the 45,957 presently in use (nearly 27,000 more than at the turn of the century) and the pumping stations supply the water at pressures required to fight fires effectively.

During the year, 106,932 feet of pipe (more than 20 miles) were placed in service. At the end of 1969, the Chicago Water Distribution System comprised a network of almost 4,128 miles of cast iron, steel, ductile iron and concrete pipe varying in size from 4 to 60 inches in diameter. This does not include the miles of mains in the water distribution systems of the suburbs supplied by the Chicago Water System.

In response to the continuous growth and improvement of Chicago and the resulting increase in water demand, the Water Distribution Division also installed 420 valves to bring the total number of valves in use up to 42,981.

With the aim of minimizing hidden leakage in Chicago's vast underground water main system, mains are continuously monitored electronically. A program of plumbing inspection and reinspection in building structures during 1969 also proved itself effective in reducing the amount of water lost through leaks.

Wasted water places an unnecessarily heavy load on the water system and thus increases plant requirements disproportionately. In order to reduce such waste to a minimum, a program of waste water control was placed into effect calling for a two-way attack on the problem: (1) discovering and correcting leaks in household services and plumbing fixtures, and (2) discovering and correcting leaks in over 4,100 miles of water mains in the ground.

The net effect of this two-pronged vital water saving program has been to lower the average daily pumpage



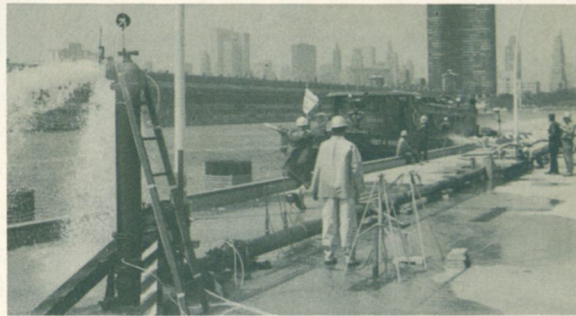
Replacing main in tunnel under Chicago river.



Removing tapping machine after cut.



Installing side connection to 60-inch main.



Special test to determine energy losses in hydrants. They are regularly tested also to ensure adequate water pressure to fight fires.

CHICAGO WATER MAINS  
IN SERVICE AS OF  
DEC. 31, 1969  
4,128 MILES  
OR THE DISTANCE  
FROM CHICAGO  
THROUGH THE  
EARTH'S CENTER



demand on the Chicago Water System over the years in spite of the national trend to the contrary. These savings have been made also in the face of the additional usages that both industry and the family have found for water in such equipment as air conditioning units, dishwashers, washing machines, and lawn sprinklers.

It is significant to note that the system is pumping less today than it did in 1930 even though there has been an increase of over one million in the population served and a substantial increase in the industrial demands. This is not due to Chicagoans using less water, but to the savings in the pumpage elsewhere in the system which actually over-balance the additional usages found for water.

Construction of a 78-inch pressure tunnel leading from the Mayfair Pumping Station at a depth of 150 feet below the Kennedy Expressway

and railway tracks was completed in 1969. Water from the pumping station can now be distributed through a new 54-inch main at Wilson and Laverne Avenues, thus improving water service to that area.

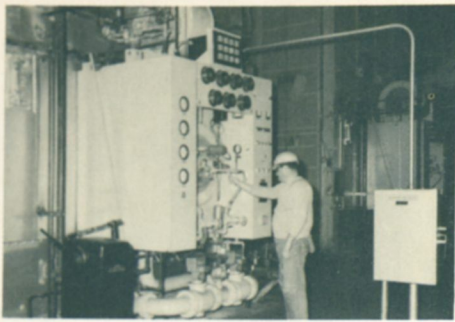
The comprehensive plan for the Telemetric Data Amassing System envisions a network which eventually, when in full operation with all of the proposed remote sensing units, will be capable of monitoring water pressures at key points in the many miles of water pipe and providing serviceable information regarding Chicago's water distribution system. At the end of 1969, twenty-three of the sensing units that have been installed so far were in full operation, continuously transmitting collected data to the central reporting panel located at the Central Water Filtration Plant.

During 1969, two suburban communities were added to the list of those supplied with water by the

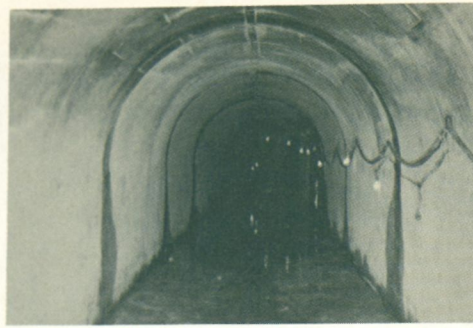
Chicago Water System. Since June 24, 1969, residents of Hickory Hills have been receiving water from the City of Chicago to supplement their supply of well water, via the facilities of the Justice-Willow Springs Water Commission. It is not unusual for a municipality to obtain water through another community that receives water from the Chicago Water System when such an arrangement is approved by the Chicago City Council.

On July 24, 1969, the Chicago Water System began furnishing water to the Central Stickney Sanitary District, so that by the year-end the Bureau of Water supplied water to 72 suburban communities, in addition to the corporate area of Chicago. In compliance with State legislation, charges for water sold to incorporated municipalities located in the Metropolitan Sanitary District of Greater Chicago are at the same rate as the metered rate charged users in the City of Chicago.

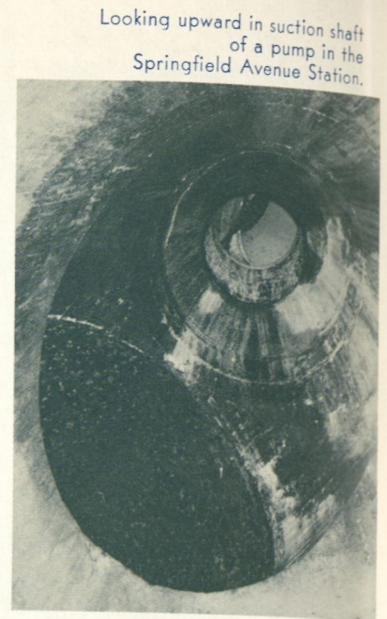




Gas conversion unit is installed at Western Avenue Pumping Station.



New tunnel to Springfield Avenue Pumping Station is lined with concrete.

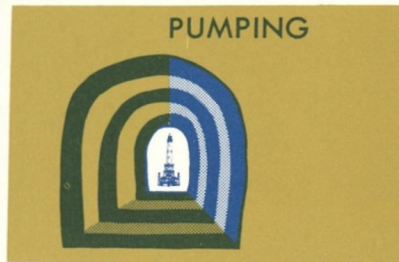


Looking upward in suction shaft of a pump in the Springfield Avenue Station.

The Chicago Water System's eleven pumping stations provide the boost in pressure necessary in order for treated water to reach Metropolitan Chicago's 4,738,000 water users. The stations, which are equipped with pumps having a total capacity of 2,995 million gallons a day, are operated and maintained by the Pumping Station Operation Division. With such a reliable pumping capacity in each station, the most effective use of the pumping equipment can be made without any interruption in service even during peak load periods.

The pumps and auxiliary equipment of the stations are housed in buildings which were architecturally suited to their surroundings at the time of their construction. Because of careful planning, the Chicago Water System's two newest stations, the Southwest Pumping Station and the Lake View Pumping Station, contribute substantially to the attractiveness of the areas in which they are located.

The Southwest Station occupies a prominent place in a four-square-block interagency development that includes a seven-acre park and an elementary school. The Lake View Station is situated within a two-acre area. The sites of both stations are tastefully landscaped.



During 1969, a total of 373,575 million gallons of water was pumped by the stations. The year's daily average pumpage, amounting to 1,023 million gallons, is considerably lower than for the year 1930, due primarily to the maintenance procedures that minimized the loss of water through leakage.

The eleven pumping stations are strategically located in the City and pump the water used within the 440 square miles that make up the Chicago and suburban area served by the Chicago Water System. Six of these stations are powered by electricity and the other five by steam.

The fuel conversion program, which is directed toward the elimination of possible particulate and sulfur dioxide emissions from the stacks of the steam-driven pump stations, is progressing according to schedule. Under this program, boiler equipment is being converted to use gas fuel, with a secondary oil fuel. It was discovered that, as an added benefit of this changeover, the Western Avenue Pumping Station's boilers that have been converted can be operated with greater flexibility when gas fuel is used rather than coal.

Prior to the end of 1967, one of the functions of the Pumping Station

Operation Division was to add supplementary doses of chlorine to the water pumped through certain stations. Since chlorine is now added to the water at only the two filtration plants, chlorination equipment at the pumping stations would be superfluous. The removal of chlorine conduits, hoses and steel fittings from shafts at the Chicago Avenue, Cermak, Springfield Avenue, Central Park Avenue and Mayfair Pumping Stations was completed in 1969.

During this year of the centennial anniversary of the famed Chicago Water Tower and the Chicago Avenue Pumping Station, measures were taken against the deterioration of the Joliet limestone of which both structures are constructed. Since this type of limestone is no longer available, it is important to have an adequate maintenance program for the Tower and the station.

Unfortunately, Joliet limestone is in great danger of disintegration when subjected to adverse atmospheric conditions. Tests were conducted with limestone preservatives that are anticipated to reduce porosity by forming a quartz (transparent crystalline mineral) shield when applied to the stone surface. With this method of protection from erosion, the structures can be preserved at minimal expense.





Large meters are regularly checked by engineers to ensure accuracy in billing.

## METERING

By the end of 1969, the total number of water meters in service had climbed to 164,377. Since the beginning of 1953, when the newly created Department of Water and Sewers assumed the combined responsibilities for the operations of both the Chicago Water and Sewer Systems, 41,431 meters have been added. More meters were installed during the 17 years of the Department's existence than were in service during 1924. Of these, 2,730, including replacements, were installed during 1969.

The Water Meter Division controls and keeps a detailed record of each meter in service. In 1969, a total of 16,085 meters were tested in the Division shop, most of which were completely reconditioned. Also, 18,337 meters were repaired in the field on the premises of the water users.

As in previous years, all water meters purchased during 1969 were tested at the plants of the manufacturers under the supervision of Division inspectors to insure compliance with specifications prior to

their shipment to the meter shop. This method of examining meters before, rather than after, acceptance and delivery has proven to be practical and economical.

Under a pilot program launched during the year, 15 remote-reading water meter devices (five from each of three different manufacturers) were installed. These outside-installed devices enable meter readers to read the inside-installed water meters without entering the homes or buildings in which they are located.

The remote readers duplicate the registration totalizing the amount of water used as shown on the meter itself. If these remote reading devices can be used effectively, much time will be saved in reading meters and they will eliminate problems frequently encountered in many areas of the City when the readers must enter buildings to read the water meters.

It is interesting to note that 80% of the revenue comes from metered accounts. It is believed that Chicago sells more water through meters than any other city in the world.

## ASSESSING, BILLING AND COLLECTING

The number of accounts serviced by the Water Collection Division since the Department of Water and Sewers was established has increased by more than 60,000 and many changes and improvements in the assessing, billing and collecting procedures have been made. The project of converting the Department's billing and accounting methods to a computer system passed the midpoint during 1969 and it is anticipated that by the end of 1970 these processes will be completed.

At the close of 1969, the total number of accounts on the books of the Division had risen to 512,403. Water fund collections for the year amounted to \$59,082,480.14; of which \$47,516,787.59 were from metered-rate accounts; \$11,403,675.23 from assessed-rate accounts; \$57,871.36 from sewer rental accounts for properties outside the corporate limits of Chicago; and \$104,145.96 from miscellaneous sources.

During 1969, the Water Collection Division's field men made 1,198,452 visits to properties for the purpose

of reading meters; 59,769 to make assessments and resolve the water bill problems that may have arisen; and 42,133 to collect \$639,852.87 from delinquent accounts.



New computer system provides Collection Division with consumer information.



CITY OF CHICAGO



RICHARD J. DALEY  
MAYOR

DEPARTMENT OF WATER AND SEWERS



1 0 1 2  
SCALE IN MILES

(STAND - BY)

CARTER H. HARRISON  
CRIB  
WM. E. DEVER CRIB

CENTRAL WATER  
FILTRATION PLANT

4 MILE CRIB  
(STAND - BY)

M I C H I G A N

68TH ST. CRIB

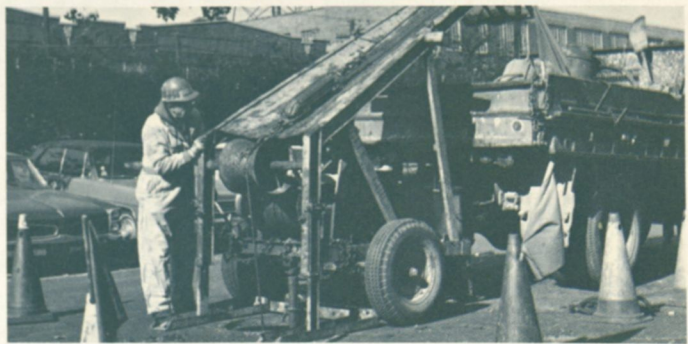
ED. F. DUNNE CRIB

SOUTH WATER  
FILTRATION PLANT

3 - 70

- |  |   |
|--|---|
|  | INTAKE CRIBS—IN USE   |
|  | INTAKE CRIBS—STAND-BY   |
|  | WATER TUNNELS—IN USE  |
|  | WATER TUNNELS—STAND-BY  |
|  | FILTRATION PLANTS   |
|  | PUMPING STATIONS  |
|  | RESERVOIR   |
|  | LARGE FEEDER MAINS—EXISTING                                   |
|  | LARGE FEEDER MAINS—FUTURE                                     |
|  | CITY OF CHICAGO   |
|  | SUBURBAN AREAS SUPPLIED BY THE CHICAGO WATER SYSTEM           |
|  | SUBURBAN AREAS PARTIALLY SUPPLIED BY THE CHICAGO WATER SYSTEM |

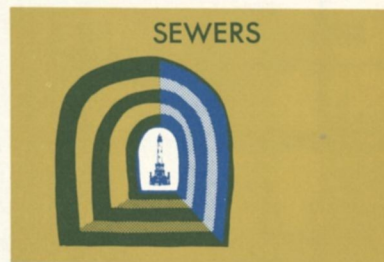




Sewer scrapings are automatically loaded into truck for disposal.

An adequate sewer system is absolutely necessary in order to maintain a healthy environment, safe and free from nuisances of flooding. It is the vital responsibility of the Bureau of Sewers to dispose safely of water that has been contaminated by consumer use. After it has been utilized for cleansing, cooking, fighting fires, or for any of the innumerable uses of water, or if it is polluted by wastes that nurture virulent bacteria, it must be carried away before it becomes hazardous to public health.

The street sewer system that collects waste water from every building in the City and the storm water from the streets has developed into the vast drainage network that,



at the end of 1969, included 4,095 miles of sewers, 146,975 manholes and 212,865 catch basins. In the last seventeen years, since the Department of Water and Sewers was established in 1953, a total of \$157,252,297 has been invested in capital improvements for the Chicago Sewer System.

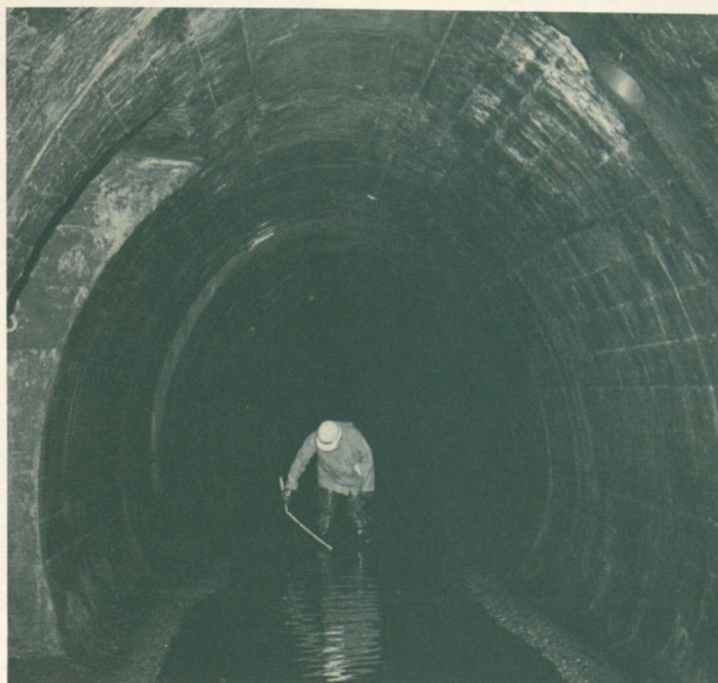
The construction of many industrial, commercial and residential buildings in Chicago necessitates that additions be made continually to the City's drainage system. Very little land on which there is not some type of construction remains. With the total rooftop area, which has grown so rapidly, plus the great increase in roadways, highways and parking areas, the combined impervious surface space amplifies the storm water removal problem.

The sewer tunnel under construction some 250 feet below Lawrence Avenue in Chicago's far northwest area will, when completed, be a great stride toward alleviating flood troubles and preventing pollutants from reaching inland waterways. This tunnel, an entirely new concept of sewer systems, will be the first of its kind operating in the United States. It was designed by and is being constructed under the supervision of the Department of Public Works. Because of the tunnel's depth, an underground mining

Workers installing forms prior to rebuilding arch of brick sewer.







A monolithic concrete sewer is inspected to determine extent of damage to invert (bottom) caused by certain industrial wastes.

procedure, rather than the older, more conventional open cut or trenching methods which often disrupt surface traffic, is being followed. The huge rock mining machine, known as the "mechanical mole" by engineers, is 13½ feet in diameter and has a giant rotating drill with rock cutters on the face that is forced on the rock with tremendous pressure. What is cut from the rock is collected and removed by a conveyor.

When the Underflow Sewer System commences operation, normal dry weather flow will continue to be collected by the existing upper level sewers and discharged into interceptors of the Metropolitan Sanitary District of Greater Chicago. When the capacity of the regular

sewers is exceeded because of heavy runoff, however, the excess will be diverted into the deep-level Lawrence Avenue sewer rather than overflow into the Chicago waterways. Thus, large quantities of runoff will be stored until the waste treatment plants of the Sanitary District are again able to cope with the stored storm and sanitary flow.

An area of approximately 3,620 acres will be benefited under this improvement. The tunnel runs five miles westward on Lawrence Avenue, from the North Branch of the Chicago River near California Avenue to Melvina Street. Similar

CHICAGO SEWER LINES  
IN SERVICE AS OF  
DEC. 31, 1969  
4.095 MILES  
OR THE DISTANCE  
FROM CHICAGO  
THROUGH THE  
EARTH'S CENTER



Checking a repaired sewer pipe that had been damaged by industrial wastes.

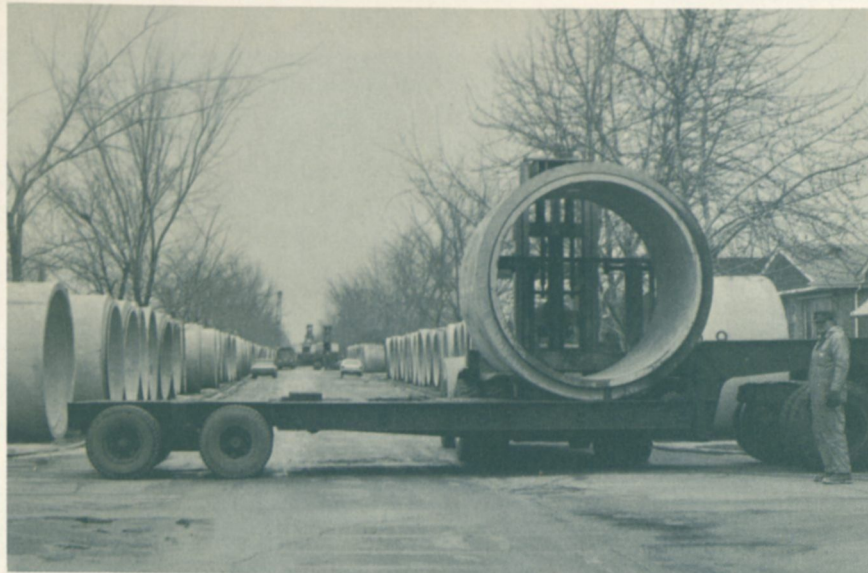
deep tunnel systems have been proposed for construction in other areas of Metropolitan Chicago. It is anticipated that these plans, when carried through, will reduce pollution in river and canals by some 98%.

During dry periods of the year, when material settled at the bottom of the sewers and catch basins, cleaning was especially important for the prevention of blockages. Certain chemical additives used with high pressure hoses fed from mobile flushing units were found to be most effective in loosening the built-up mud and silt deposits so they could be floated away. This is one of the procedures that help to





Unloading 90-inch reinforced concrete sewer pipe to be installed on South Side.



## SEWERS

keep the Chicago Sewer System operating at top efficiency.

The primary purpose of the preventive maintenance program is to reduce the number of emergency assignments. Field forces use the latest methods and equipment in the

performance of repair, maintenance and construction activities. When confronted with emergency situations, such as major sewer breaks, water breaks, natural emergencies, or while working with the Chicago Fire Department, or the Metropolitan Sanitary District, a

mobile radio communication system is utilized in the control and direction of crews and field equipment.

Cleaning and repair crews performed a variety of services during the year. In addition to scraping 8,662,710 feet of sewer, they cleaned 398,669 catch basins and repaired 681 main sewer breaks, 9,363 catch basins and 1,875 manholes.

The duties of the Bureau's staff of inspectors include insuring compliance with City standards when newly installed sewers are connected to the Chicago Sewer System. During 1969, mason inspectors assigned to construction projects, both public and private, supervised the construction of 21.03 miles of sewer, 978 catch basins and 779 manholes.

During the year, the Bench and Grade Section Engineers of the Bureau of Sewers ran 130 miles of precise levels to establish elevations of 197 standard bench monuments and ordinary benches and 56 new street grades. Bench monuments



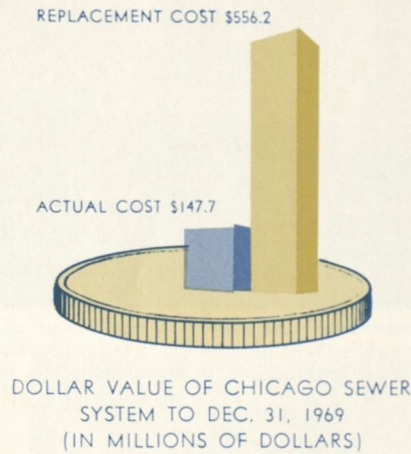
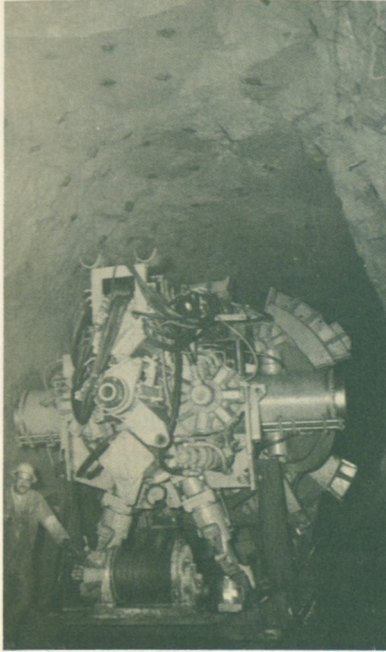
Excavating in preparation for laying sewer pipe.

Workmen locating house drain to be reconnected to new sewer being laid.

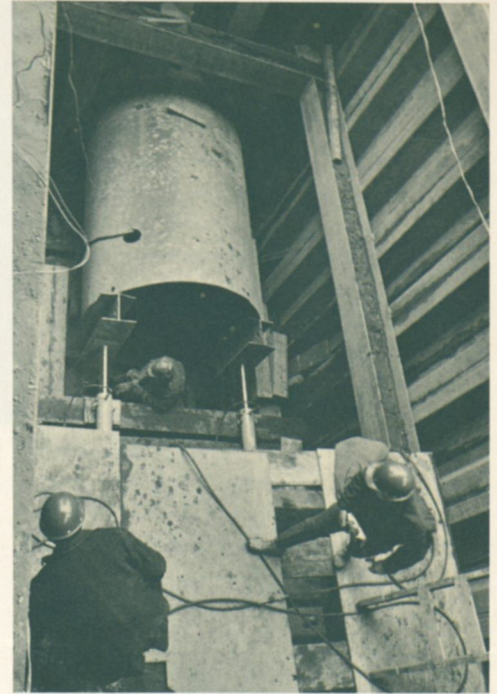




Another section of the disassembled "mechanical mole."



Tube is forced into earth to act as shield when tunnel is dug.

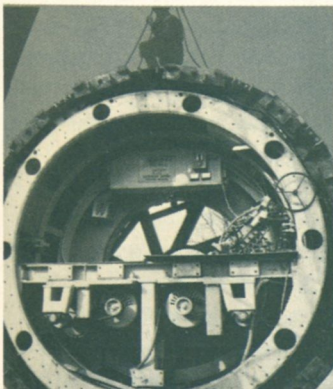


(eight-foot concrete columns buried in the ground) are points of known elevation established for the use of architects, engineers and surveyors to determine correct elevations when constructing buildings, sewers, bridges and other structures which must match the elevations of exist-

ing improvements within close tolerances.

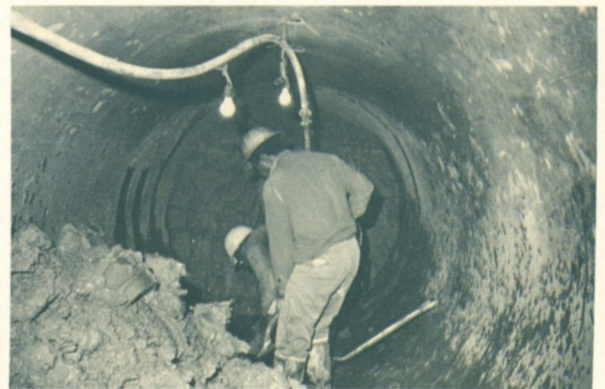
As a means of familiarizing foremen in the various sewer cleaning districts with problems that exist, or are likely to arise, in all sections of the City, a program of district foreman rotation was placed

into effect during 1969. Under this rotation scheme, each foreman is required to direct the sewer cleaning work in each of the other districts for a certain period of time. The success of this program is evident in the improved district activities and operating procedures.



Mechanic assembling rock mining machine stands by head-cutter.

An eductor truck crew cleaning Lake Shore Drive catch basin.



Workers are engaged in clay mining operation ahead of jacking pit.





Left—Steamfitters' safety attire protects against contact with dangerous chemicals while they repair caustic soda feeding equipment. Right—When conditions indicate the need of gas masks, their use is mandatory.



Safety engineering and accident prevention in water utility operations have been among the primary concerns of this organization's managing personnel since 1953, when the Department of Water and Sewers was established. The Department was one of the first municipal units of the large-city departments in the country to adopt a formal safety program for the purpose of reducing employee injuries caused by accidents and to protect the public from mishaps that might occur during field work activities.

The program includes a procedure for accident reporting and recording, which enables it to provide the United States Department of Labor, the National Safety Council and the American Water Works Association with useful pertinent information. In compliance with requests,

the Department has also been sending its Annual Accident Data Report to many private and governmental organizations that make use of it in planning or implementing their own safety programs.

A Safety Committee, composed of the safety director and representatives of the various operating divisions of the Department's two Bureaus, met regularly throughout 1969 to discuss safety policies. Safety committees at lower organizational levels have also been formed so that safe work practices can be made an integral part of the actual work activities. All accidents which are reported by the Divisions are analyzed to determine how recurrences can be prevented.

Safety Bulletins, in which ways are suggested to avoid accidents at work, at home and on the road, were sent periodically to employees. Just prior to the year's principal holidays, all workers and their families received greeting letters which always included safety reminders from the office of the Commissioner. Also, the new quarterly Department newspaper for employees carried articles urging

readers to be careful—to guard against accidents.

During the 1969 meetings of the Department Safety Committee, plans for the compilation of a new safety manual were considered and discussed. It is intended that all available means of interdepartmental communication be utilized to stress the importance of good safety habits to all employees.

In a recent letter to the Department, the National Safety Council commented, "Your ten-year record of achievement is noteworthy since few municipalities came close to your accomplishment." The Department has benefited greatly from the comprehensive safety program since its inception in 1954.

The safety record established by the Department during the years since then has lowered operating costs considerably by reducing time lost due to accidents. The real burden of accidents, however, is manifested not only in terms of dollars and cents, but, most of all, in the suffering and hardships created for the individuals involved and their families.





In-service training class in session at Central Water Filtration Plant, one of the Department's methods of increasing job-interest and efficiency of its employees.

During 1969, the Department of Water and Sewers intensified its training activities with intent to increase the knowledge and raise the skills of its present personnel to higher levels—for the benefit of the individual employee as well as the Department and the public it serves.

Employees were encouraged to participate actively in the Department's training program. Evidence of their receptive response included the enrollment of 60 employees in the Chicago City College and the Jones Commercial High School through the Public Service Institutes and the Skill Improvement Program. These employees received specific job-related training to improve their educational background.

Accredited college courses that are applicable toward college degrees were financed by the Civil Service Commission through a tuition reimbursement program. Such courses were completed by 33 employees during 1969.

Many Departmental workers participated in other Civil Service sponsored training activities, such as the Inter-Agency Training Courses offered by the United States Civil Service Commission, and the Executive Development Program.

## IN-SERVICE TRAINING



During May of 1969, 220 supervisors in both Bureaus concluded an orientation type training program which commenced in October of the previous year. Participants were separated into two groups, each of which attended a one-half day session each month during the program.

The Bureau of Sewers sponsored an in-service training program concerning construction and inspection methods and techniques for 80 House Drain and Mason Inspectors who attended seven one-half day sessions, the last of which was held in August.

The Water Purification Division of the Bureau of Water, which operates the world's two largest water treatment plants, is conducting a special program of instruction for technical personnel. Two training sessions are being held each month during a ten-month period for approximately 120 employees, including engineers, chemists, bacteriologists and biologists. Subjects under study are designed to increase the competency of the participants in the discharge of their job assignments.

In cooperation with the efforts of the City of Chicago, other governmental agencies and private industry to alleviate the shortage of qualified technical personnel, the Department of Water and Sewers encouraged the Southeast Campus of the Chicago City College to establish a two-year program for the education of potential environmental control technicians. The Department employed eleven of the students which had enrolled in this program on a cooperative basis.

As they become available for employment after completing the course, their educational background will qualify them to hold permanent positions in various programs dealing with pollution control. In this way, the Department will be able to utilize more effectively the capabilities of these people who will have more advanced education and thus, reduce the need for employees with 4-year college degrees.

The Department gave a further boost to its recruitment of technical personnel by cooperating with colleges in the Chicago area to the extent that students, who were regarded as potential full-time employees, were hired as engineers-in-training and laboratory technicians during the summer months. Stenographic and clerical students also were employed as clerk trainees on such a part-time basis.



Supervisory personnel of the Bureau of Sewers instruct house drain inspectors regarding accuracy of records.





# CITY OF CHICAGO DEPARTMENT OF WATER AND SEWERS

## PRELIMINARY STATEMENT OF INCOME, EXPENSE AND CITY EQUITY<sup>1</sup> YEAR ENDING DECEMBER 31, 1969

Operating Revenues:		
Sales of Water .....	\$ 58,509,674	
Other Operating Revenues .....	693,112	
<b>TOTAL OPERATING REVENUES .....</b>	<b>\$ 59,202,786</b>	
Operating Expenses Excluding Depreciation:		
Source of Supply .....	\$ 549,765	
Power and Pumping .....	7,302,869	
Purification .....	9,196,367	
Transmission and Distribution .....	14,550,614	
Drainage, Maintenance and Operation .....	8,752,897	
Consumer Accounting and Collection .....	2,698,623	
Administrative and General .....	4,086,903	
<b>TOTAL OPERATING EXPENSES EXCLUDING DEPRECIATION .....</b>	<b>\$ 47,138,038</b>	
Operating Income Before Depreciation .....	\$ 12,064,748	
Depreciation Expense .....	8,048,087	
<b>Operating Income .....</b>	<b>\$ 4,016,661</b>	
Add Non-Operating Income .....	209,873	
Deduct Non-Operating Expense:		
Net Interest on Water Certificates .....	\$ 5,719,555	
Other Non-Operating Expenses .....	79,484	5,799,039
Balance after Non-Operating Transactions .....	( 1,572,505)	
Operations of Working Capital Funds .....	( 450,273)	
Expenses in Excess of Income .....	( 2,022,778)	
<b>CITY EQUITY, JANUARY 1 .....</b>	<b>\$280,052,854</b>	
Less Surplus Adjustments .....	203,643	279,849,211
<b>CITY EQUITY, DECEMBER 31 .....</b>	<b>\$277,826,433</b>	

<sup>1</sup>Accrual Basis

## CAPITAL IMPROVEMENTS

During 1969, a total of \$11,531,243 was invested in the Chicago Water System for the improvement of its plants and facilities. Expenditures for the principal projects included: \$1,459,129 for expansion and additions to the chemical treatment facilities and for other improvements in the filtration plants; \$843,890 for improvements in the System's eleven pumping stations, of which a portion was used to defray expenses incurred during the process of converting the boiler equipment in the five steam-operated pumping stations to use gas or oil fuel rather than coal; \$1,430,494 for improvement of water tunnels and cribs; \$7,219,794 for the construction of new water mains; and \$577,936 for the purchase of new equipment.

The preliminary Five-Year Capital Improvement Program for the Chicago Water System, which was planned in cooperation with the Departments of Public Works and Development and Planning, covers the period from 1970 to 1974. Subject to annual revisions and approval by the City Council, the program provides for a total investment of \$108,053,000, which will include \$35,000,000 for tunnels and shafts; \$18,520,000 for the filtration plants; \$18,322,000 for pumping stations; and \$36,211,000 for water main construction and maintenance.

## FINANCE

The Chicago Water System is supported by the revenues received from the sale of water. No funds are derived from real estate or other taxes. Since it is a municipally-owned utility, the water rates are designed to cover operating, maintenance and debt service costs; it is not operated for profit.

During 1969, the System's total cash receipts amounted to \$70,512,510, while operating and maintenance expenses totaled \$47,169,753. Debt service costs of \$12,453,125 included interest and principal payments on Certificates of Indebtedness.

Total investment in fixed assets rose from 515.2 million dollars to 527.4 million dollars during the year. The net book value of the Chicago Water Fund's fixed assets is 427.8 million dollars. However, the Chicago Water System's actual replacement value is estimated to exceed one billion dollars.



# CITY OF CHICAGO DEPARTMENT OF WATER AND SEWERS

## PRELIMINARY BALANCE SHEET<sup>1</sup> DECEMBER 31, 1969

### ASSETS

Capital Assets:		
Land and Land Rights .....	\$ 2,021,400	
Utility Plant in Service .....	\$518,498,462	
Less Accumulated Depreciation .....	99,618,409	418,880,053
Construction in Progress .....	6,862,053	
<b>TOTAL CAPITAL ASSETS .....</b>	<b>\$427,763,506</b>	
Investment in Working Capital Funds .....	7,462,647	
Current Assets:		
Cash Deposited and on Hand .....	\$ 4,282,876	
Accounts Receivable .....	5,583,266	
Due from Other City Funds .....	184,446	
Inventories .....	1,907,833	
<b>TOTAL CURRENT ASSETS .....</b>	<b>11,958,421</b>	
<b>TOTAL ASSETS .....</b>	<b>\$447,184,574</b>	

### LIABILITIES AND CITY EQUITY

City of Chicago Equity .....	\$277,826,433	
Long Term Liabilities:		
Certificates of Indebtedness .....	\$157,000,000	
Conditional Construction Advances .....	444,023	
<b>TOTAL LONG TERM LIABILITIES .....</b>	<b>157,444,023</b>	
Current Liabilities:		
Vouchers Payable .....	\$ 10,536,491	
Interest Payable .....	1,063,237	
Due Other City Funds .....	228,130	
Refunds and Judgments Payable .....	86,260	
<b>TOTAL CURRENT LIABILITIES .....</b>	<b>11,914,118</b>	
<b>TOTAL LIABILITIES AND CITY EQUITY .....</b>	<b>\$447,184,574</b>	

<sup>1</sup>Accrual Basis



SOURCE AND APPLICATION OF WATER FUNDS<sup>2</sup>  
FOR THE YEAR ENDED DECEMBER 31, 1969  
( PRELIMINARY STATEMENT )

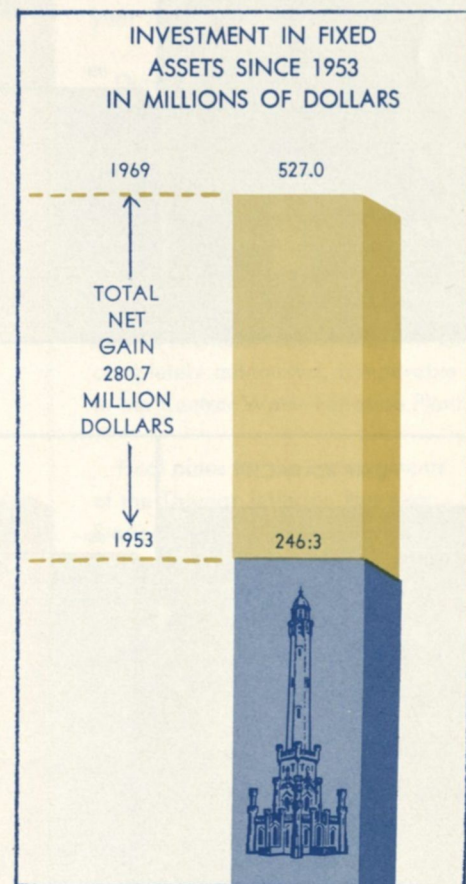
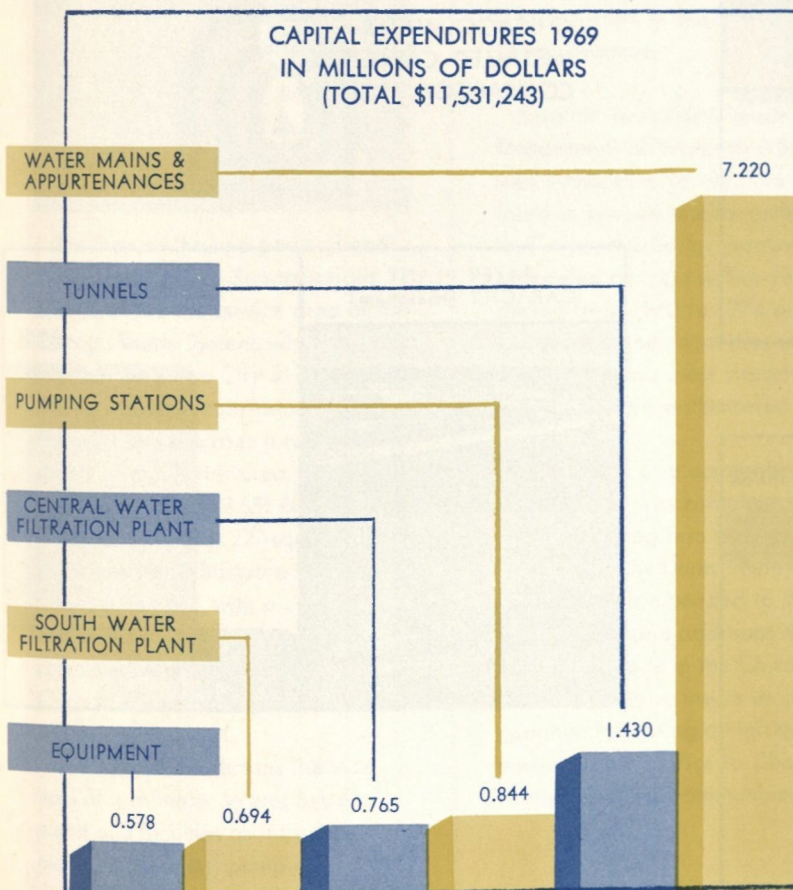
CASH RECEIVED FROM:

SALES OF WATER		Percent
Loop and Large Commercial Users .....	\$15,005,802	21.28
Large Industrial Consumers .....	9,774,203	13.86
Small Consumers .....	9,603,143	13.62
Suburban Consumers .....	13,133,640	18.63
Total from Metered Sales .....	\$47,516,788	67.39
Non-Metered Residential .....	11,403,675	16.17
Total Cash from Sales of Water .....	58,920,463	83.56
Permits, Rentals, Reimbursements, Financial Income, Sale of Salvage and Various other Cash Received .....	1,227,467	1.74
Repayments from Other Funds by Transfer .....	10,364,580	14.70
TOTAL OF CASH RECEIVED .....	\$70,512,510	100.00

CASH DEDICATED TO:

OPERATING COSTS		Percent
Purification .....	\$10,236,904	14.52
Pumping .....	8,701,748	12.34
Distribution .....	15,901,591	22.55
Accounting & Collecting .....	3,173,473	4.50
Drainage, Maintenance & Operations .....	9,156,037	12.99
Total Operating Costs .....	\$47,169,753	66.90
Debt Service		
Retirement of Long Term Debt .....	\$ 6,500,000	9.22
Interest Paid .....	5,953,125	8.44
Total Debt Service .....	12,453,125	17.66
Cash Expended for Capital Improvement .....	10,889,632	15.44
TOTAL CASH DEDICATED .....	\$70,512,510	100.00

<sup>2</sup>Cash Basis





# DEPARTMENT OF WATER AND SEWERS

## BUREAU OF WATER

### Investment in Capital Improvements 1953-1969

Filtration Plants	\$119,628,170
Pumping Stations	50,313,362
Water Tunnels & Cries	36,388,003
Water Mains & Distr. System	103,468,491
Total Investment*	\$309,798,026

\*Does not include equipment.

### Preliminary Capital Improvements Program 1970-1974

Filtration Plants	\$18,520,000
Pumping Stations	18,322,000
Water Tunnels	35,000,000
Feeder Mains 24" dia. and larger	5,929,000
Small Mains & Miscellaneous	27,282,000
Miscellaneous	3,000,000
Total Program	\$108,053,000

## BUREAU OF SEWERS

(Programed under the direction of the Department of Public Works)

### Investment in Capital Improvements

\$157,252,297

### Capital Improvements Program 1970-1974

\$ 87,990,000

### Storm Water Control (O'Hare Airport)

8,621,000

### Total Program

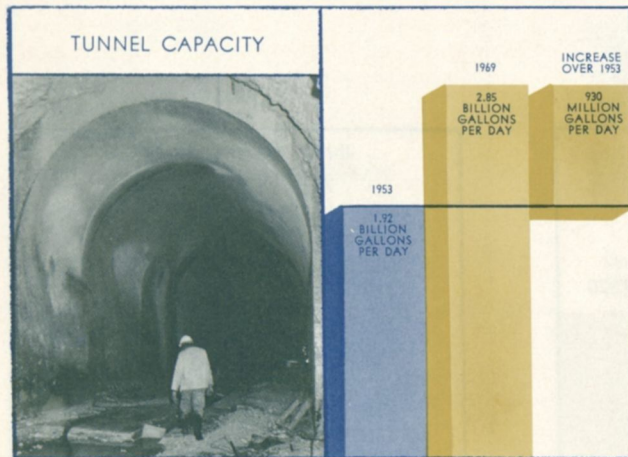
\$ 96,611,000

### Total Water and Sewers

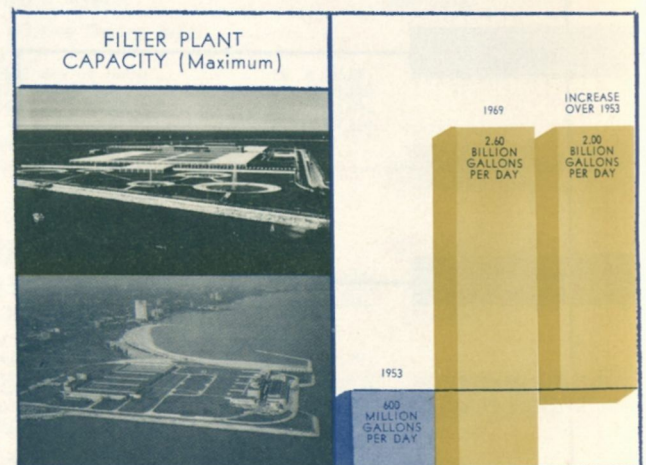
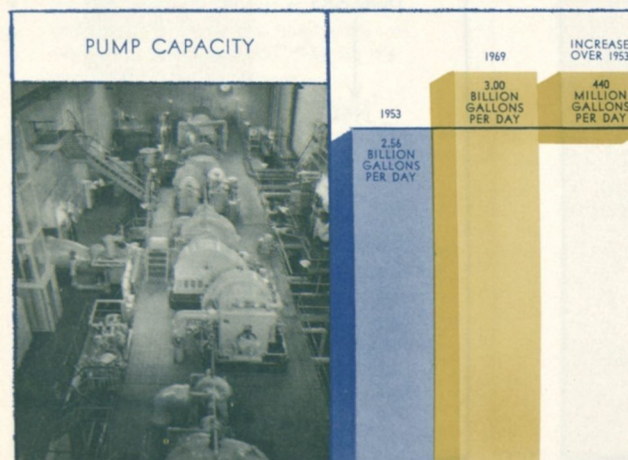
\$467,050,323

### Total Water and Sewers

\$204,664,000



## CHICAGO WATER SYSTEM INSTALLED CAPACITIES COMPARISON 1953-1969





Each year the Department of Water and Sewers, in cooperation with the Department of Public Works and the Department of Development and Planning, prepares a five-year program of major Water System improvements. The program is reviewed and revised annually to insure the Chicago Water System's ability to meet their constantly expanding responsibilities.

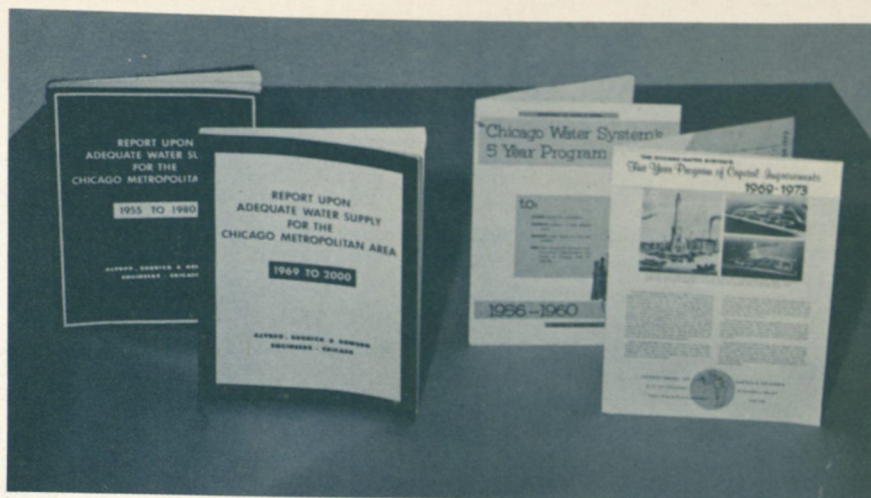
The preliminary program developed for the period of 1970 to 1974 calls for the estimated expenditure of \$108,053,000 for improvements in the Water System's tunnels and shafts, filtration plants, pumping stations and distribution system.

## THE FUTURE



The map on the two-page spread in the center of this Report (pages 12 and 13) shows the service area of the Chicago Water System, which in 1969 included the entire City of Chicago and 72 suburban communities. The area encompasses a total of 440 square miles. Of this area, the City of Chicago with its 3,551,000 residents, comprises 227 square miles. The remaining 213 square miles of suburban regions, with a combined population of 1,187,000 persons, complete the present extent of the Chicago Water System's service area.

The map also indicates the locations of such major Water System plants and facilities as filtration plants, intake cribs, pumping stations, water tunnels and distribution mains.



Anticipating the expanding demand for water, and planning for the future, are among the most important functions of the administrative and engineering staffs of the Chicago Water Works System.

On the pages immediately preceding this page are presented graphic explanations of the investments that have been made by the City of Chicago and the investments it is currently planning to make in capital improvements to the Water and Sewer Systems.

Capital investments made since the Department of Water and Sewers was established in 1953 are tabulated in type-of-facility arrangement, and expenditures for improvements scheduled during the five-year period from 1970 to 1974 are listed. Increases in the capacities of the Water System's most important facilities also are illustrated.

The results of a comprehensive study, which was completed in 1969 by a consulting firm that had been retained by the Department, provided the information needed to determine the changes and additions that should be made in the Chicago Water System to insure its ability to continue furnishing a high quality water supply service to Chicago and to the suburban communities that

rely upon the System. This study will aid the Department in projecting the water demands it will be required to meet during the period ending in the year 2000, and to plan accordingly.

During 1969, the seven-year program aimed toward the modernization of the South Water Filtration Plant's instrumentation progressed according to schedule. When the goal of this program has been fully attained, the South Plant will be monitored by a computer-data logger and its chemical feed system will be completely automated, comparable to the Central Water Filtration Plant.

Final plans for the improvements of the Thomas Jefferson Pumping Station are under consideration by this Department and the Department of Public Works. The fact that the present pumps at this station have been in operation for over 40 years together with the changes that have been made in the water main distribution system and the realignment of pumping station areas necessitate over-all changes to bring the station into gear with the demands of the zone it serves.



1969

## MAJOR WATER AND SEWER STATISTICS

## SEWERS

## Existing Sewer System

Miles of Sewer .....	4,095.02
Catch Basins .....	212,865
Manholes .....	146,975

## 1969 New Sewer Construction

Miles of Sewers—all sizes .....	21.03
Catch Basins .....	978
Manholes .....	779

Inspections ..... 170,025

Complaints Handled ..... 40,374

## Repairs

Total Number of Sewer System Repair Jobs .....	12,576
Main Sewer Breaks .....	681
Catch Basins .....	9,363
Manholes .....	1,875
Gutter Grates and Basin Outlets .....	657

## Cleaning

Sewers Scraped—Feet .....	8,662,710
Catch Basins Cleaned .....	398,669

## Street Grades Established and Approved

by City Council ..... 56

## Standard Bench Monuments and Ordinary

Benches Established ..... 197

## Receipts

House Drain Permit Fees .....	\$ 66,350
Other Permit Fees .....	62,322
Special Deposits .....	182,509
Out-of-Town Connection Fees .....	57,871
Drain Layers' License Fees .....	36,900
Total Receipts .....	\$ 405,952

## WATER

## Population and Area Served

(Based on Reliable estimates)

## Population supplied:

Chicago (1960 U.S. Census 3,550,404).....	3,551,000
Suburban (Year-end census as revised).....	1,187,000
Total .....	4,738,000

## Area served (in square miles):

Chicago .....	227
Seventy-two suburbs .....	213
Total .....	440

## Per Capita Consumption

	Gallons Per Day
Chicago .....	243
Suburban .....	136
Average .....	216

Chemical and Physical Qualities of Water at Intake  
(Central Water Filtration Plant)

Total hardness (as parts per million Calcium Carbonate) .....	131
Water temperatures: Intake	
Average .....	49.2°F.
Maximum .....	76.0°F.
Minimum .....	32.0°F.

## Pumpage

	Gallons
Annual	
Chicago .....	314,480,200,000
Suburban communities and industries (metered) .....	59,094,400,000
Total* .....	373,574,600,000

\*(Amount through  
Western Ave. Reservoir ..... 1,925,890,000)

Annual Metered Consumption in Chicago  
(52.5% † of Chicago pumpage)..... 164,997,000,000  
†Percentage of Revenue  
from Metered rates: 80.2%

Daily	
Total daily average .....	1,023,490,000
Maximum day, July 16.....	1,618,920,000
Maximum hour (rate) July 16, 8:00 P.M. ....	2,180,000,000
Daily Average—Chicago .....	861,600,000
Daily Average—Suburban .....	161,900,000



## WATER

### Purity Control

Laboratory tests made:	
Bacteriological Laboratory .....	132,290
Microscopically for plankton .....	7,044
Chemical Laboratory .....	83,041
Electron Microscope .....	10,137
Control Laboratory S.W.F.P.....	140,553
Control Laboratory C.W.F.P.....	241,590
Total tests made.....	614,655

### Bacteriological Results

Annual average coliform organisms per 100 ml\*

	South District		North & Central District	
	Crib	Shore	Crib	Shore
Raw .....	25.0	18.0		100
Plant outlet .....	0.03		0.007	
Pumping stations .....	0.007		0.014	
Distribution system .....	0.056		0.034	

\*U. S. Public Health Service Standard for safe drinking water permits a maximum average of 1.0 coliform organisms per 100 ml.

### Purification Treatment

	Gallons
Complete Filtration Treatment .....	385,775,000,000

### Chemicals Applied—Tons

	SWFP	CWFP
Chlorine .....	1,485	2,498
Aluminum Sulfate (17% $Al_2O_3$ ).....	5,011	8,595
Activated Carbon .....	1,271	1,379
Lime .....	2,619	4,194
Ferrous Sulfate (as $FeSO_4$ ).....	2,340	3,689
Anhydrous Ammonia .....	141	
Hydrofluosilicic Acid (As Fluorine).....	505	798
Caustic Soda (NaOH) .....		1,361

### Supply

Crib intakes in service .....	1
Crib intakes on stand-by service.....	3
Shore intakes .....	2
Miles of water supply tunnels under lake and land (6 to 20 feet in diameter).....	72.3

### Pumping

Pumping stations .....	11
Pumps available for service .....	53
Installed pumping capacity (Million gallons per day) .....	2,995

### Annual Pumpage

	Million Gallons
By electrically driven pumps .....	151,449
By steam driven pumps .....	222,126
Total annual pumpage.....	373,575
Coal used by steam powered pumps (tons).....	112,413
Electric power used by electrically powered pumps (kilowatt hrs.) .....	78,313,393

### Distribution

Water Mains: (in miles)

In use—December 31, 1969.....	4,127.83
Extended .....	20.26
Abandoned .....	10.14
Net addition to system .....	10.12
Diameter of pipe (inches) .....	4 to 60

Fire Hydrants:

In use—December 31, 1969.....	45,957
Installed .....	175
Abandoned .....	82
Net Increase .....	93

Valves:

In use—December 31, 1969 .....	42,981
Installed .....	420
Abandoned .....	97
Net Increase .....	323

Pressure range in mains

(lbs. per square inch) .....	28 to 58
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Average pressure at curb

(lbs. per square inch) .....	36
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Miles of pipe tested for underground leakage.....

	3,544.29
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Premises inspected—house to house

leakage survey .....	48,014
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Repaired main breaks—4 inch

to 36 inch in diameter .....	222
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### Meters

In service—December 31, 1969 .....	164,377
Installed by Master Plumbers .....	2,596
Installed by Water Distribution Division .....	134
Total .....	2,730
Removed .....	2,076
Net Increase .....	654
Repaired on premises .....	18,337
Repaired in shops .....	15,678
Tested .....	16,085
Non-metered (assessed rate) services .....	348,026
Total Services (assessed & metered).....	512,403

Supplements covering complete 1969 water or sewer statistics are available upon request.



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